

## CLAIMS

We claim:

1. A method of detecting a target nucleic acid sequence, said method comprising:
  - a) attaching a first adapter nucleic acid to a first target nucleic acid sequence to form a modified first target nucleic acid sequence;
  - b) contacting said modified first target nucleic acid sequence with an array comprising:
    - i) a substrate with a patterned surface comprising discrete sites; and
    - ii) a population of microspheres comprising at least a first subpopulation comprising a first capture probe, such that said first capture probe and said modified first target nucleic acid sequence form a hybridization complex; wherein said microspheres are distributed on said surface; and
  - c) detecting the presence of said modified first target nucleic acid sequence.
2. The method according to claim 1 further comprising
  - a) attaching a second adapter nucleic acid to a second target nucleic acid sequence to form a modified second target nucleic acid sequence;
  - b) contacting said modified second target nucleic acid sequence with said array, wherein said population of microspheres comprises at least a second subpopulation comprising a second capture probe, such that said second capture probe and said modified second target nucleic acid sequence form a hybridization complex; and
  - c) detecting the presence of said modified second target nucleic acid sequence.
3. The method according to claim 1, wherein said attaching is by an amplification reaction.
4. The method according to claim 3, wherein said amplification reaction is the polymerase chain reaction (PCR).
5. The method according to claim 3, wherein said amplification reaction is the oligonucleotide ligation amplification reaction (OLA).
6. The method according to claim 1, wherein said attaching is by chemical synthesis.
7. The method according to claim 1, wherein said modified target nucleic acid sequence comprises a label.
8. The method according to claim 6, wherein said label is a fluorescent label.
9. The method according to claim 6, wherein said adapter nucleic acid is labeled.

10. The method according to claim 6, wherein said target nucleic acid segment is labeled prior to said attaching.

11. The method according to claim 1, wherein said detecting is done by hybridizing a label probe to said modified target nucleic acid sequence.

12. The method according to claim 1, wherein said substrate is a fiber optic bundle.

13. The method according to claim 1, wherein said discrete sites comprise wells.

14. A method of detecting a target nucleic acid sequence comprising:

- a) hybridizing a first primer to a first portion of a target sequence, wherein said first primer further comprises an adapter sequence;
- b) hybridizing a second primer to a second portion of said target sequence;
- c) ligating said first and second primers together to form a modified primer;
- d) contacting said adapter sequence of said modified primer with an array comprising:
  - i) a substrate with a surface comprising discrete sites; and
  - ii) a population of microspheres comprising at least a first subpopulation comprising a first capture probe, such that said first capture probe and said modified primer form a hybridization complex; wherein said microspheres are distributed on said surface; and
- e) detecting the presence of said modified primer.